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COTTON PRODUCTION IN SOUTHERN BRAZIL

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COTTON PRODUCTION IN SOUTHERN BRAZIL 1/

INTRODUCTION

Cotton is grown in two distinct districts of Brazil: the Northeastern States and the Southern States. In Southern Brazil cotton is second in importance to coffee as a cash crop, while in the Northeastern States it is of first importance and in many sections of this area is the only cash crop grown. Not only are the economic conditions under which the crop is produced vastly different in the two areas, but the soil and climatic factors differ widely. The cotton grown is of two distinctly different types and qualities. Southern Brazil produces American Upland cotton, while in the Northeastern States the production is largely the famous Brazilian tree cotton.

Cotton was no doubt grown in Southern Brazil long before the arrival of the white man. Early settlers reported that Indians were using fabrics made from cotton, and as early as 1700 quite a quantity of raw cotton was exported from Sao Paulo. During the American Civil War, when European cotton spinners were cut off from American supplies, and immediately following the War, when prices were extraordinarily high, Brazilian cotton was an important item in the world's cotton trade. With the return to normal conditions in the United States, the Brazilian crop declined. Following the liberation of Brazilian slaves in 1888, cotton production again declined and in a few years became relatively unimportant. During the years between the American Civil War and the World War the development of the world's greatest coffee growing area in Southern Brazil overshadowed the production of cotton. Conditions since the World War, however, have again favored the production of cotton in this area.

Between 1921-22 and 1925-26 Southern Brazil produced from 120,000 to 228,000 bales of cotton. Following 1925-26 the annual production did not exceed 85,000 bales until 1931-32, when it reached 125,000. Since 1931-32 it has increased to 221,000 in 1932-33 and 500,000 bales in 1933-34.2/ An examination of the factors responsible for this renewed interest, as well as the outlook for future production in Southern Brazil, is the object of this report.

1/ This report is based upon a field investigation of cotton-growing conditions in Southern Brazil made by the author in 1934. A similar report on conditions in the Northeastern States of Brazil will be released in the near future. Further statistical analysis of the factors affecting the production of cotton in Brazil will be made as a joint project between the Foreign Agricultural Service Division and the Division of Statistical and Historical Research.

2/ From the second estimate of the Ministry of Agriculture, Rio de Janeiro 1934.

COTTON GROWING AREA

Cotton growing in Southern Brazil at present is confined to the area beyond the coastal range of mountains. Very little cotton is grown in the narrow coastal plain between the sea and the mountains. The interior region beyond the mountains, averaging about 2500 feet in elevation, is the most important agricultural section of Brazil. It is a part of the great Brazilian Plateau which extends the full length of the country from northeast to southwest. Practically all of this plateau within the state of Minas Geraes is drained by rivers flowing north; in Sao Paulo the drainage is to the west and south, and the extreme southern states drain eastward into the Atlantic Ocean. While the topography of this area is rolling and broken in some places by low hills and mountains, there appears to be little erosion. The soil ranges from a sandy clay to a clay loam and in appearance resembles the Piedmont soils of the United States. The area along the western slope of the coastal mountain range is one of the oldest agricultural regions of Brazil. Here the early Portuguese settlers planted large coffee plantations and, when the soil became exhausted, gradually moved westward. Much of this country was abandoned a hundred years ago and is today grown up in forests or is used for grazing and livestock farming. It is a common practice in Brazil, when the land is exhausted from cropping, to move westward and take up new land. This has been going on for a hundred years or more and is in part responsible for the gradual westward movement of agriculture in Southern Brazil.

The total area of the four cotton producing states of Southern Brazil (Sao Paulo, Minas Geraes, Rio de Janeiro, and Parana) is approximately 418,000 square miles, or almost as large as the combined area of Arkansas, Louisiana, Oklahoma, and Texas. If the two extreme southern states of Rio Grande do Sul and Santa Catharina are included, the total area of Southern Brazil is 565,110 square miles, or about equal to the area of the American cotton belt west of the Mississippi River plus the states of Mississippi and Alabama. While much of this area is now producing coffee, corn, and other food crops, a large part of it is still in virgin forests and prairies, uninhabited and undeveloped. It is estimated that one-half of Southern Brazil is in virgin land, much of which, if cleared, is suitable for the production of cotton, coffee, and food crops. The estimated area given over to farms, which includes land used for grazing and ranch purposes as well as the crop area, is less than 50 percent of the total area of this section. When the actual cultivated or crop producing area is considered, the estimate is less than 30 percent. In the two extreme southern states the percentage of unimproved land is much higher than in the other four southern states. The land actually under cultivation perhaps does not exceed 10 percent of the total area. In the state of Minas Geraes there are also extensive areas now utilized only for grazing. It is obvious that Southern Brazil, from the standpoint of available land, has tremendous possibilities for agricultural expansion. In the United States about 5 percent of the total area of the cotton belt is used for cotton. If only this proportion of the land area of Southern Brazil were used for cotton production, it would mean a cotton area of approximately 18,000,000 acres, about 16 times the present acreage and about 44 percent of the United States cotton acreage during the five years prior to 1932.

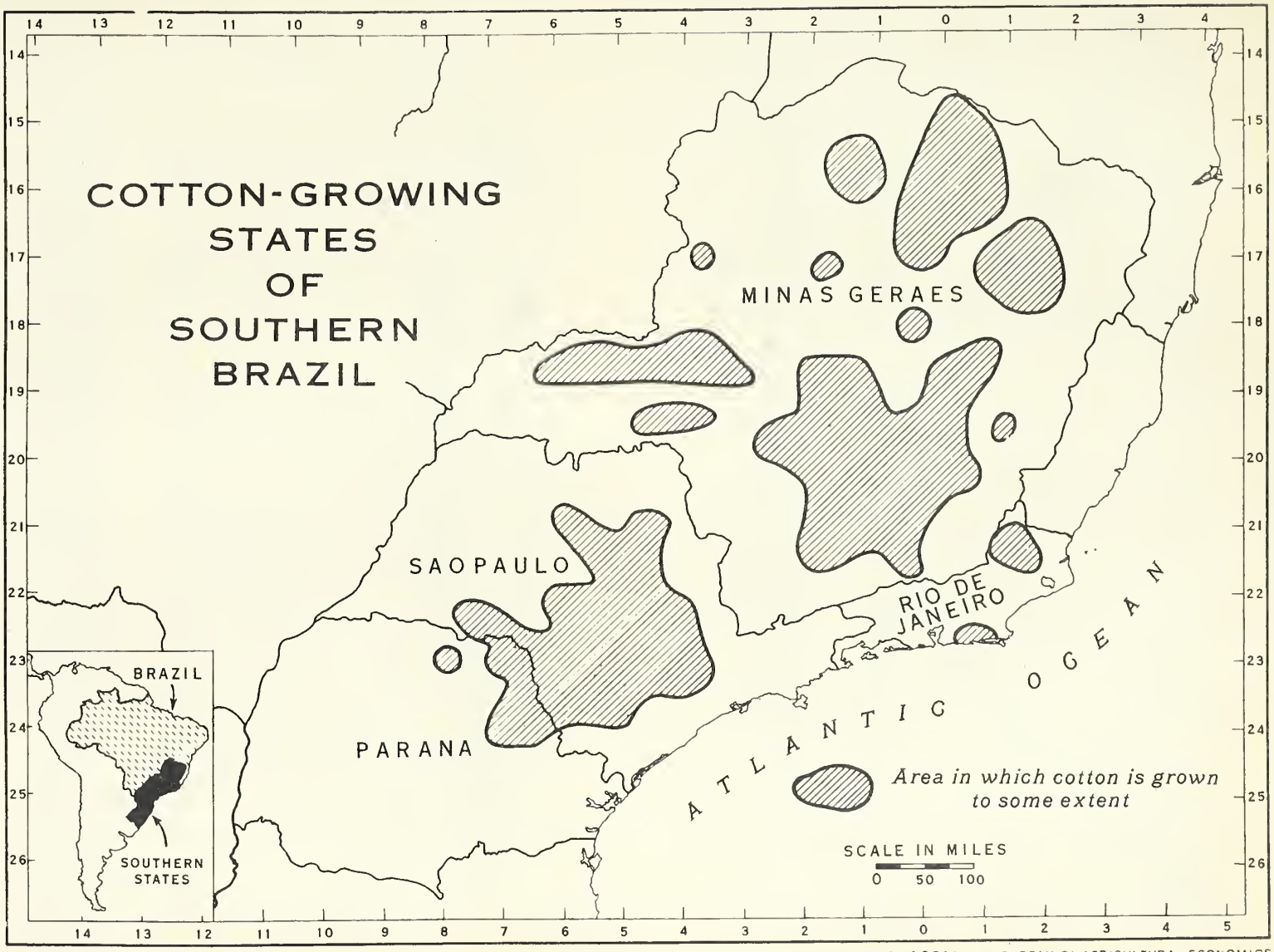

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FIGURE 1 - THE AREA OF SOUTHERN BRAZIL EXCEEDS THE COMBINED AREA OF ALABAMA, MISSISSIPPI, ARKANSAS, LOUISIANA, OKLAHOMA, AND TEXAS.

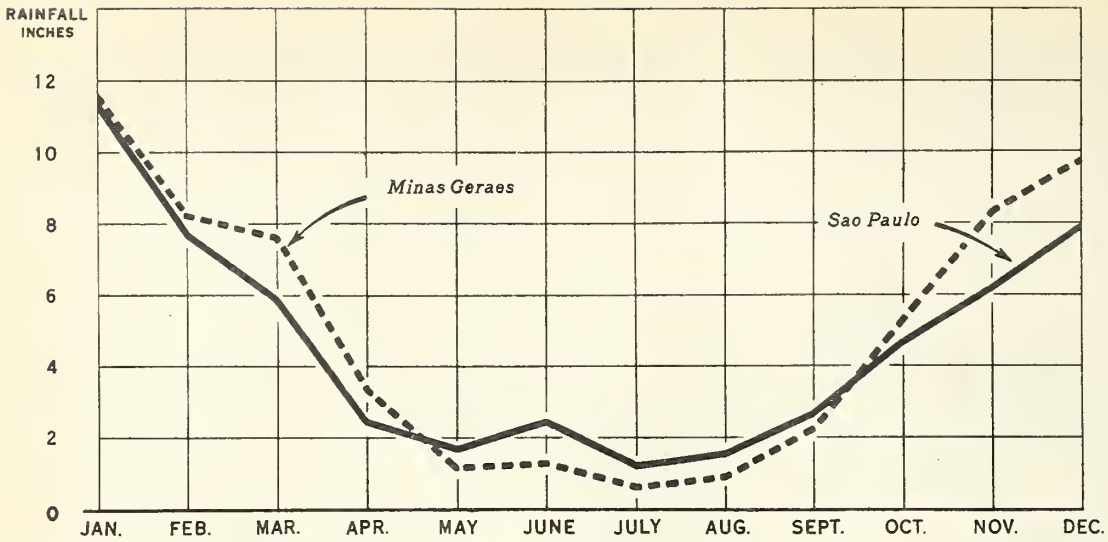

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FIGURE 2 - NORMAL AVERAGE TEMPERATURE BY MONTHS AT STATIONS IN THE COTTON BELT OF SOUTHERN BRAZIL. AT NO TIME IS THE CROP IN DANGER OF FREEZING WEATHER.

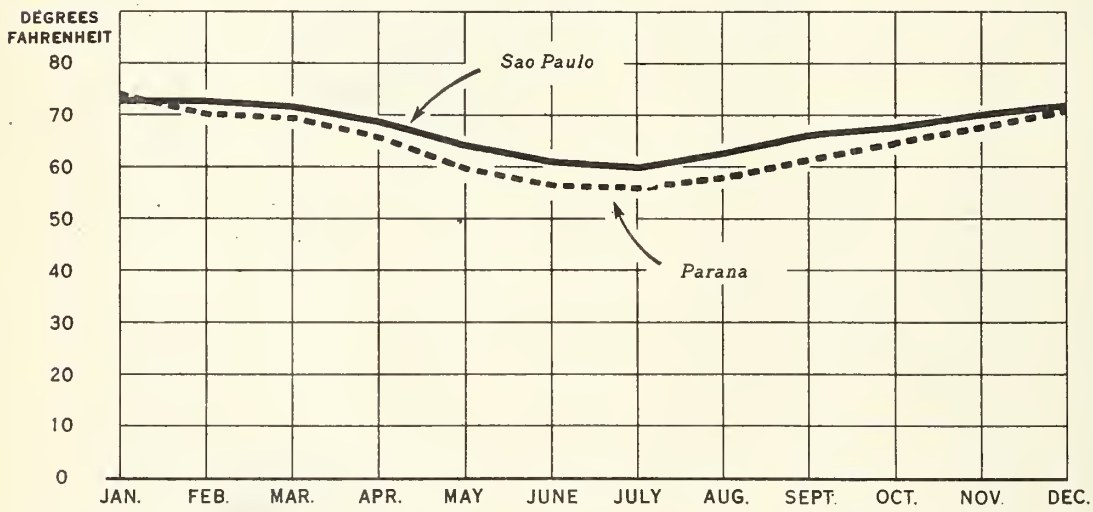

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FIGURE 3 - NORMAL AVERAGE RAINFALL BY MONTHS AT STATIONS IN THE COTTON BELT OF SOUTHERN BRAZIL. COTTON IN THIS AREA IS PLANTED FROM SEPTEMBER TO NOVEMBER AND HARVESTED FROM APRIL TO JULY.

CLIMATE

The climate of the cotton belt of Southern Brazil on the whole is favorable to cotton production. With the exception of the two southern states, which at present grow little or no cotton, the temperature of Southern Brazil never drops to freezing; in fact, since records became available, killing frosts have occurred only once or twice (Figure 3). Sao Paulo, the leading cotton growing state, because of its elevation has very agreeable winters and comparatively cool summers. The cotton area of Minas Geraes, being nearer the equator, naturally has higher temperatures in both summer and winter. The rainfall of the area is divided into two seasons, the wet and dry. While vegetation grows the year round, the fall and winter seasons, which occur during the North American spring and summer months, are much drier than the spring and summer months of September to February (Figure 2). During the growing season rainfall averages about 6 inches per month. Low temperature has little influence on cotton production in this area, rainfall being the most important climatic factor. As a rule, cotton does not suffer from drought, but during some years the rains continue into the fall season, thus making picking difficult, and often resulting in a good deal of the crop being damaged or completely lost. Cotton is planted in September, October, and November, which are the spring months, and harvested in March, April, and May, the fall months.

TABLE 1 - Normal Average Rainfall by Months at Stations in the Cotton Belt of Southern Brazil

Month	Stations *		Month	Stations *	
	Sao Paulo	Minas Geraes		Sao Paulo	Minas Geraes
	Inches	Inches		Inches	Inches
January	11.34	11.57	July	1.21	.65
February	7.68	8.25	August	1.56	.90
March	5.88	7.62	September	2.67	2.23
April	2.45	3.36	October	4.64	5.29
May	1.68	1.17	November	6.20	8.32
June	2.46	1.27	December	7.90	9.76
			Total	55.67	60.39

* Four stations in each state

Compiled from the Official Reports of the Brazilian Ministry of Agriculture, Rio de Janeiro.

TABLE 2 - Normal Average Maximum, Minimum, and Average Temperature by Months at Stations in the Cotton Belt of Southern Brazilian States

Month	Sao Paulo *			Parana *		
	Max.	Min.	Ave.	Max.	Min.	Ave.
	° F.	° F.	° F.	° F.	° F.	° F.
January	83.8	64.5	72.7	82.0	61.6	73.9
February	84.6	64.2	72.7	81.7	61.6	70.2
March	82.7	63.8	71.7	80.6	60.0	69.4
April	80.5	60.4	69.0	77.9	55.5	65.8
May	76.9	55.0	64.1	71.8	49.3	59.6
June	74.2	50.8	60.9	67.6	46.8	56.6
July	74.0	48.7	59.8	68.9	44.6	55.8
August	76.2	51.4	62.6	71.6	46.4	58.0
September	78.4	55.4	66.2	73.2	50.1	61.4
October	79.2	58.2	67.6	76.0	53.6	64.5
November	82.0	60.0	70.0	79.4	56.2	67.4
December	82.8	62.6	71.8	82.8	59.7	70.6
Year	80.0	58.0	67.5	76.0	54.0	64.2

* Two stations in each state

Compiled from the Official Reports of the Brazilian Ministry of Agriculture, Rio de Janeiro.

POPULATION AND LABOR SUPPLY

The population of Brazil is estimated at 40,000,000. Approximately half of these prople live in Southern Brazil, and 80 percent of Southern Brazil's population live in the states of Rio de Janeiro, Sao Paulo, Minas Geraes, and Parana, the four cotton growing states. Minas Geraes has an estimated population of 8,024,000, Sao Paulo 7,119,000, and Rio de Janeiro, exclusive of the Federal District (city of Rio de Janeiro), 2,162,000 people.

TABLE 3 - Population and Area of Southern Brazil by States

States	Population	Area
		Square miles
Rio Grande do Sul	3,263,944	110,140
Santa Catharina	1,061,113	36,679
Parana	1,090,712	77,180
Sao Paulo	7,119,418	95,459
Minas Geraes	8,024,177	229,270
Rio de Janeiro	2,162,120	16,372
Total	22,721,484	565,110

Compiled from Brazil 1933, Brazilian Ministry of Foreign Affairs, Rio de Janeiro

Rio de Janeiro is the most densely populated state, followed by Sao Paulo and Minas Geraes. The sparsely settled state of Parana has only a few more than one million population, while the two most southern states have a combined population of more than four million. The people are largely Portuguese, or of Portuguese stock. There is, however, quite a mixture of native Indian and negro blood. The latter were originally slaves. Portuguese language, customs, and traditions predominate.

Immigration into Southern Brazil has been heavy in past years. Large numbers of Italians, Spaniards, Portuguese, Germans, and Japanese have settled in the Southern States. The Germans have settled largely in Rio Grande do Sul and Santa Catharina, while the Italians, Portuguese, and Japanese have settled in the state of Sao Paulo. Several large colonization syndicates have been organized by various foreign interests during the last twenty years but with only fair success. The most successful, however, are those formed by the Japanese. Some of the colonization schemes were originally planned for the purpose of growing cotton, but because of the lack of transportation, low cotton prices, and the demand for labor on the coffee plantations, they have not been entirely successful. Most of these companies are now engaged in a land sales business rather than in actual operation of cotton plantations. Much of the agricultural labor necessary to produce and harvest the coffee crop of this area is supplied by immigrants. The Europeans, especially Italians, Portuguese, and Spaniards, seem to be satisfied to work as laborers on the large coffee plantations, while the Japanese prefer to buy their own land. Within a short time after arrival practically all Japanese settlers become land owners. The Japanese Consul at Sao Paulo estimates that 42 percent of the cotton grown in the state during the 1933-34 season was produced by Japanese labor.3/

In the past Brazil has encouraged immigration, but in recent years a feeling that immigration should be restricted or selected has developed. The constitution adopted in 1934 provides for a restriction on immigration. While it is altogether possible that some effort may be made in the future to limit certain classes of immigration, it is clear that there is a shortage of labor in relation to the enormous undeveloped area. While there are several large cities in Southern Brazil where industry has developed rapidly, the area is largely agricultural.

PHYSICAL FACILITIES FOR HANDLING COTTON

Transportation facilities in Sao Paulo, in southern Minas Geraes, and in the state of Rio de Janeiro are the best to be found in Brazil. While but little more than 10 percent of the total area of the Republic, these states contain approximately 55 percent of the country's railroad mileage. The present agricultural districts have fair transportation facilities, but there are still large sparsely populated areas in which transportation is a major problem. This is particularly true of Parana,

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3/ From a statement made in the local press of Sao Paulo during the harvest season of 1933-34. The Japanese Consulate maintains an Agricultural Agent for the benefit of Japanese settlers.

western Sao Paulo, and northern Minas Geraes. Cotton production, like other agricultural development, has followed the lines of railroads, and until highways or railroads are built into the new areas, much of the land will remain undeveloped. The bulk of the cotton crop of Southern Brazil is produced within the districts where transportation facilities are good.

The present gins of Southern Brazil were unable to handle the increased crop of 1933-34. Under normal conditions in the past the ginning season has closed about July 1, but because of the size of the 1933-34 crop and the scarcity of gins it is doubtful if the 1933-34 crop will be ginned before the 1934-35 crop starts to move. Many of the present gins are small and in poor repair. In the state of Sao Paulo, where the most modern and up-to-date ginning equipment is found, only 242 gins were reported in 1932. 4/ Most of these were small one stand plants; in fact, the total number of stands of the 242 plants was only 337 and the number of saws 17,718, or about 50 saws per stand. Other ginning plants of Southern Brazil are, on the average, smaller than those of Sao Paulo.

During the 1933-34 season the import of ginning equipment increased rapidly and a number of new plants were located. However, the imports of new equipment have not increased the number of new ginning plant locations to the extent the import statistics might indicate. The reason is that a large percent of the recent imports of ginning machinery is being used as replacement and not for the establishment of new locations.

For several years the government has attempted to improve the quality of the work of the gins, but only recently it adopted a system of inspection and licensing of the operation of cotton gins. As a result of this inspection many of the small worn-out plants have been closed. In order to operate at all the owners of these plants are now replacing the old plants with new machinery. This, as well as the large crop and the outlook for the future, has stimulated the imports of ginning machinery. Much of the ginning equipment being sold in Brazil is of American manufacture.

The lint is pressed at the gin into bales ranging from 180 to 400 pounds, depending upon the size of the press. Export cotton is compressed at Sao Paulo. Physical facilities for handling export cotton are rather poor and undeveloped but, as the export trade imcreases, this condition will improve.

Southern Brazil has a number of local cotton seed oil mills and presses.

4/ Economical Aspects of Brazilian Cotton Cultivation. Publication No. 4, Directory of Textile Plants, Brazilian Ministry of Agriculture, Rio de Janeiro.

COTTON PRODUCTION, ACREAGE, AND YIELDS

The Brazilian crop during the last 20 years has averaged approximately 520,000 bales of 478 pounds per year. Of this, the Southern States have produced an average annual crop of about 133,000 bales or 25 percent of the country's total. For the five-year period from 1914-15 to 1918-19 the average annual crop was 392,000 bales, of which 20.5 percent, or about 80,000 bales, was grown in the Southern States. During the five-year period ended 1923-24 the country's total crop increased to an annual average of 514,000 bales, while the average of the Southern States increased to almost 146,000 bales, or 28.3 percent of the total Brazilian crop. The following five years ended 1928-29 the average annual crop of the entire country again increased while the Southern States crop declined to about 109,000 bales, or less than 20 percent of the total. Since 1929-30 both the average crop of the country and that of the Southern States have increased rapidly. The five-year average from 1929-30 to 1933-34 was 609,000 bales for the whole country, while the average of the Southern States during this period was 197,000 bales, or 32.3 percent of the total cotton of the country. While the increases of the country as a whole during this five-year period, when compared with the previous five-year period, are not outstanding, the increase of the last three years in the Southern States is of particular significance.

From a crop of 88,500 bales in 1930-31 the Southern States increased until in 1933-34 a crop estimated at 500,400 bales, or 51.7 percent of the total Brazilian crop, was harvested. The 1932-33 crop was 221,800 bales or 49.5 percent of the total, while the 1931-32 crop was 125,800 bales and equal to 21.9 percent of all cotton grown in the country. (Figure 4)

TABLE 4 - Cotton Acreage and Production in Brazil and Southern Brazil, 1924-25 to 1933-34

Year	All Brazil		Southern Brazil	
	Acreage	Production	Acreage	Production
	Acres	Bales 1/	Acres	Bales 1/
1924-25	1,573,600	793,200	446,100	226,700
1925-26	1,320,300	601,600	311,800	118,800
1926-27	1,090,600	512,400	179,200	81,700
1927-28	1,301,400	509,100	179,900	73,800
1928-29	1,357,700	445,800	170,200	45,300
1929-30	1,461,400	583,200	155,200	52,700
1930-31	1,655,900	471,200	287,200	83,500
1931-32	1,941,200	574,700	358,200	125,800
1932-33	1,810,000	447,800	632,400	221,800
1933-34	2,519,500	968,700	1,113,200	2/ 500,400

1/ Bales of 478 pounds net
2/ Second official estimate

Compiled from the Official Reports of the Brazilian Ministry of Agriculture.

Of the cotton growing states of Southern Brazil, Sao Paulo is by far the most important. Minas Geraes, Rio de Janeiro, and Parana grow cotton, but at no time has the total of these states equaled that of Sao Paulo. The fluctuations of cotton production in Southern Brazil are due largely to increases or decreases in the state of Sao Paulo. During the last 20 years production in the Southern States other than Sao Paulo has increased but the total crop of Southern Brazil has followed the fluctuations in Sao Paulo. On the whole, states other than Sao Paulo have produced but 25 percent of the Southern States' total. Next to Sao Paulo, Minas Geraes is the most important. Rio de Janeiro and Parana have never been heavy cotton growing states and only in the last ten years have attracted enough attention to be listed in official statements. A small amount of cotton may be grown in the states of Santa Catharina and Rio Grande do Sul, but it is at present insignificant. The recent increases of the Southern States are largely a reflection of the increases in Sao Paulo.

The 1929-30 crop of Sao Paulo was 18,100 bales or 34.3 percent of the southern crop, while five years later (1933-34) it was 417,300 bales or 83.4 percent of the total crop.5/ Following 1929-30 more than 60 percent of all cotton in Southern Brazil was grown in Sao Paulo. The 1931-32 crop was equal to 77.5 percent and the 1932-33 crop to 72.2 percent of the total of Southern Brazil. (Figure 5)

TABLE 5 - Cotton Acreage and Production in Sao Paulo and All Other Southern States, 1924-25 to 1933-34

Year	Sao Paulo		All Other Southern States	
	Acreage	Production	Acreage	Production
	Acres	Bales 1/	Acres	Bales 1/
1924-25	337,700	177,300	108,400	49,400
1925-26	235,900	81,200	75,900	37,600
1926-27	130,300	60,400	48,900	21,300
1927-28	104,800	46,100	75,100	27,700
1928-29	92,500	20,500	77,700	24,800
1929-30	52,200	18,100	103,000	34,600
1930-31	148,300	50,700	138,900	32,800
1931-32	223,100	97,500	130,100	28,300
1932-33	438,200	160,100	194,200	61,700
1933-34	859,900	417,300	253,300	83,100

1/ Bales of 478 pounds

Compiled from official reports of the Brazilian Ministry of Agriculture, Rio de Janeiro, Brazil.

5/ From the second estimate of the Ministry of Agriculture, Rio de Janeiro. The final estimate is due in February, 1935.

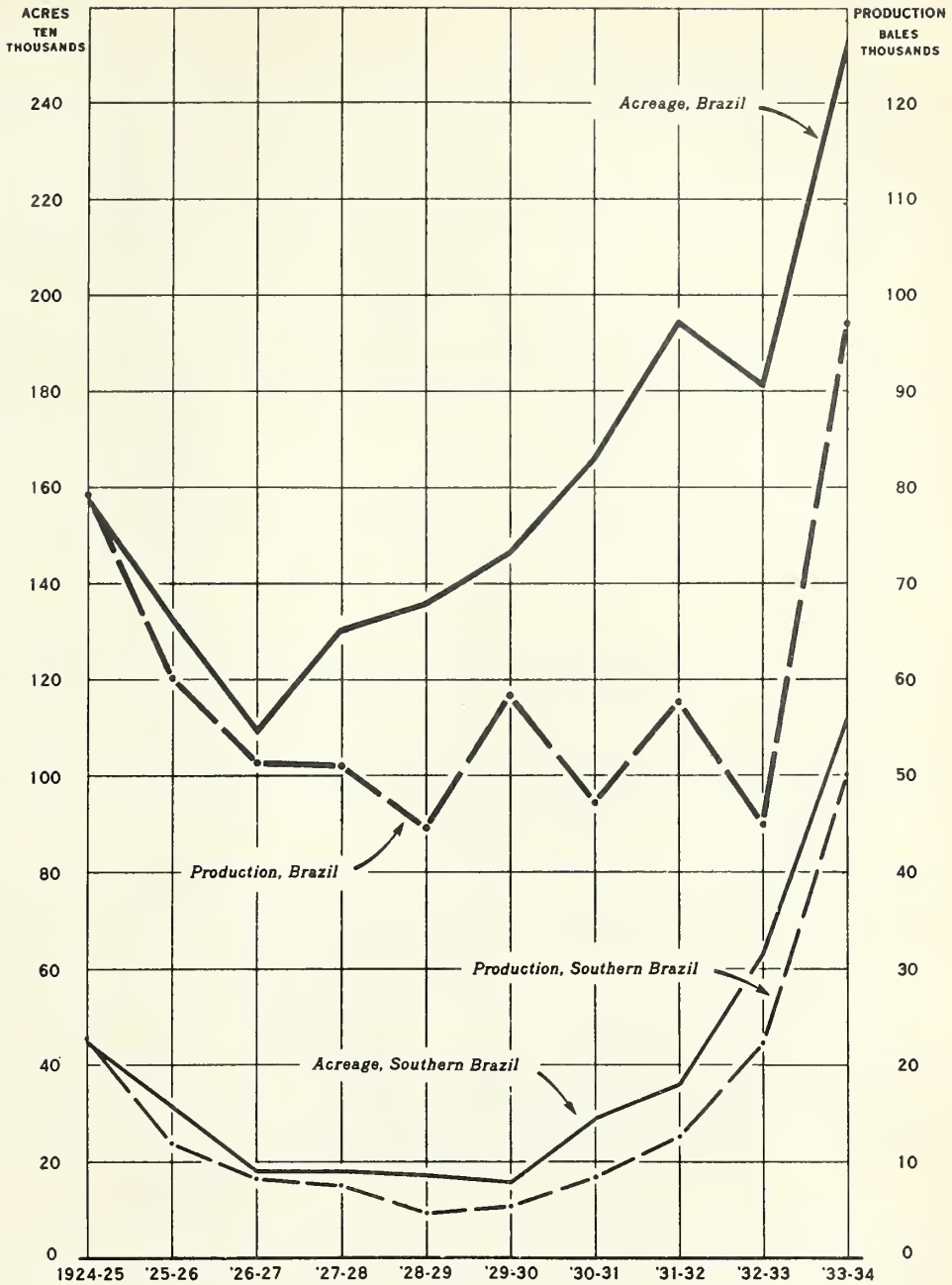

FIGURE 4 - COTTON ACREAGE AND PRODUCTION IN BRAZIL AND SOUTHERN BRAZIL, 1924-25 TO 1933-34. ON THE AVERAGE SOUTHERN BRAZIL HAS PRODUCED ABOUT 25 PERCENT OF THE BRAZILIAN CROP.

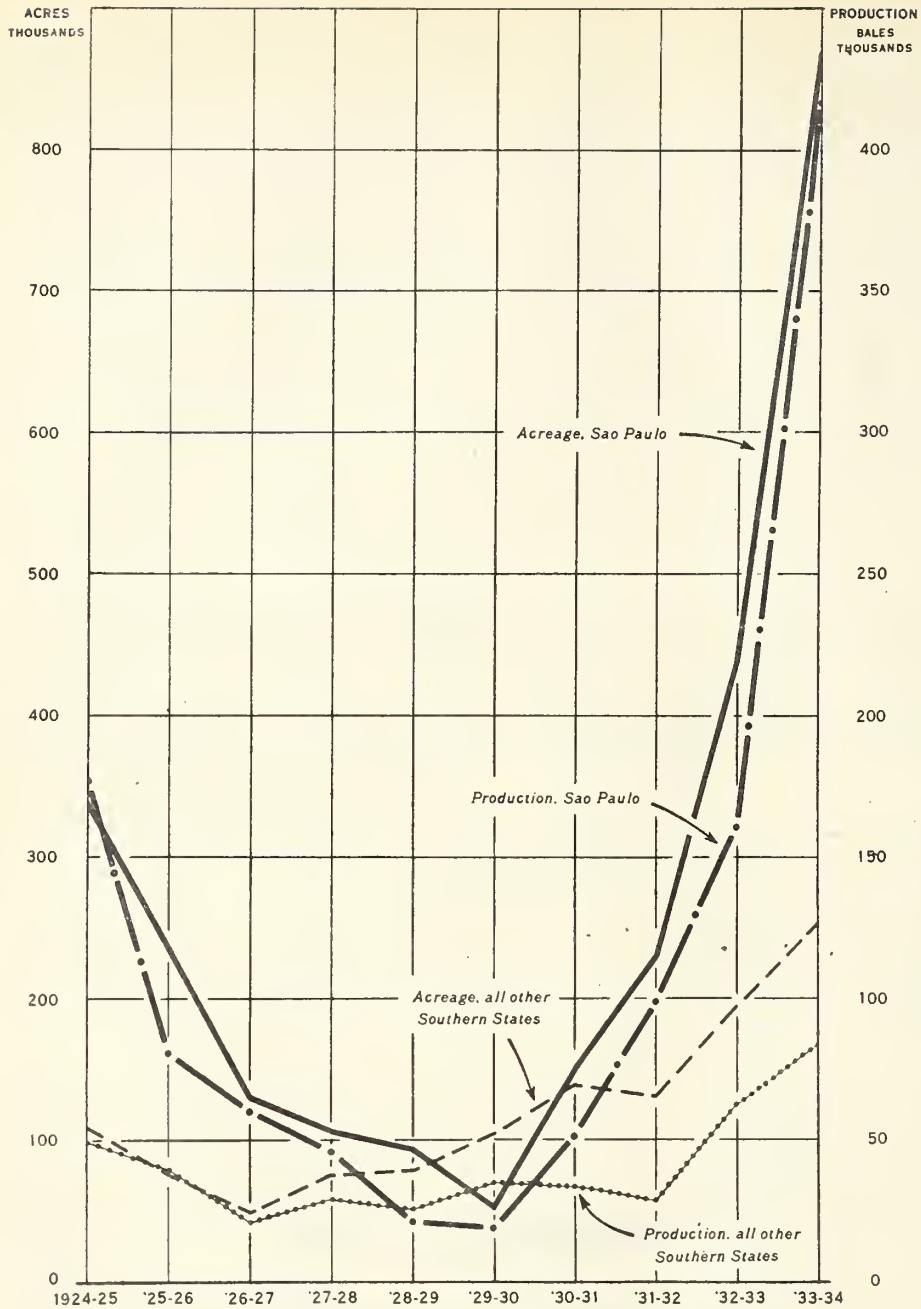

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FIGURE 5 - COTTON ACREAGE AND PRODUCTION IN SAO PAULO AND ALL OTHER SOUTHERN STATES, 1924-25 TO 1933-34. SAO PAULO HAS AVERAGED 68.9 PERCENT OF THE TOTAL SOUTHERN STATES' ACREAGE.

During the period for which acreage data are available the total cotton area of all Brazil has exceeded 2,000,000 only once. The average acreage for the ten-year period ended 1933-34 was 1,603,160 acres. The average acreage for the first five years of this period was 1,328,720 acres, while for the five-year period ended 1933-34 it averaged 1,877,600 acres. The increase during the last five years was due to the unusually high acreage of the past three years. The 1933-34 acreage was 2,519,500 acres, while the 1931-32 and 1932-33 acreages were 1,941,200 and 1,810,000 acres respectively.

Cotton acreage of the Southern States has fluctuated widely in the last ten years. From 446,100 acres in 1924-25 cotton plantings in these states declined to 155,200 acres in 1929-30, but since that year have increased until a record acreage of 1,113,200 acres in 1933-34 was reached. The average for the five-year period 1924-25 to 1928-29 of 257,440 acres was due largely to heavy plantings in 1924-25 and 1925-26. The last three years of this five-year period acreage ranged from 170,200 to 179,900 acres. During the entire five-year period ended 1928-29 the Southern States planted only 19.4 percent of the total cotton area of Brazil.

Following the low acreage of 1929-30, cotton planting in the Southern States has increased rapidly. The 1929-30 acreage was only a little more than 10 percent of the total acreage of Brazil, while the record acreage of 1933-34 was 44.2 percent of the total cotton acreage. The annual plantings of the Southern States for the five-year period ended 1933-34 was 23.9 percent of the total Brazilian cotton acreage.

During the ten years since 1924-25 the cotton acreage of Sao Paulo has fluctuated between 52,200 acres in 1928-29 and 859,000 acres in 1933-34, but with the exception of 1929-30 was more than 50 percent of the total Southern States acreage. The 1929-30 acreage of this state was equal to about one-third of the total Southern States acreage. In recent years the cotton acreage of the southern states other than Sao Paulo has increased faster than that of Sao Paulo. During the five years ended 1928-29 Sao Paulo averaged 70 percent of all southern cotton acreage while for the last five-year period the average was 68.6 percent. Most of the acreage increases outside of Sao Paulo were in Minas Geraes and Parana. Rio de Janeiro has planted very little cotton during the last five years.

Cotton yields of Southern Brazil during the ten-year period ended 1933-34 averaged 182 pounds per acre, while the average for the entire country was 180 pounds per acre. The Southern States yields on the average show wider fluctuations than those of the country as a whole. During this period, however, there has been a downward trend in yields in all sections of the country (Figure 8).

In the state of Sao Paulo yields have fluctuated more than the average for the Southern States or the country at large. It is noticeable of Southern Brazil and especially of Sao Paulo that low yields are often associated with low acreage. The explanation is no doubt found in the fact that growers, during periods of unfavorable cotton conditions, not only plant less cotton but give less attention to the cultivation of the land planted, the reason being that they employ their time to better advantage in other crops.

Rainfall is an important factor in yields in Southern Brazil. Although yields are seldom affected by dry weather, excessive rainfall during harvest season may reduce the crop. Heavy rains occurring during March, April, May, and June interfere with picking and as a result the harvest may be delayed. Because cotton and coffee harvest periods occur at about the same time, rainy weather at this season may make it necessary to use all available labor in harvesting the coffee crop during the days of sunshine. Under such conditions cotton is often sacrificed in order to harvest the coffee. During such periods a part of the cotton may never be picked and as a result average yields are reduced.

Yields are also affected by insects, chief of which is the pink boll worm. The damage from this insect varies from year to year, and is a factor in the annual fluctuations of yields. Plant diseases and other pests are also prevalent. As cotton becomes more widespread, the damage from insects and diseases may be expected to increase. This, however, may be offset to some extent by a vigorous policy of control on the part of the government. The problem of the control of insects and diseases in a semi-tropical area the size of Southern Brazil, where the climate is humid and vegetation grows the year round, is not a simple matter.

There is little or no commercial fertilizer used at present. With large areas of undeveloped land available, it appears to the farmers of Brazil to be more economical to clear new land than to use commercial fertilizer, practice crop rotations, or grow soil-building crops. This practice of exploiting the land is followed with respect to coffee production and is characteristic of farming in a new country.

TABLE 6 - Average Yield of Cotton in Brazil, the Southern States and Sao Paulo, 1924-25 to 1933-34

Year	Brazil	Southern States	Sao Paulo
	Pounds per acre	Pounds per acre	Pounds per acre
1924-25	241	243	251
1925-26	218	182	165
1926-27	225	218	222
1927-28	187	196	210
1928-29	157	127	106
1929-30	191	162	166
1930-31	136	139	164
1931-32	142	168	204
1932-33	118	168	175
1933-34	184	1/ 215	1/ 232

1/ Second estimate for the Southern States

Compiled from the official reports of the Brazilian Ministry of Agriculture, Rio de Janeiro, Brazil.

FIGURE 6 - A COTTON FIELD IN SOUTHERN BRAZIL. ALL COTTON IN THIS SECTION IS OF AMERICAN UPLAND TYPE. THE LEADING VARIETIES ARE SELECTIONS FROM TEXAS SEED.

FIGURE 7 - BAGS OF SEED COTTON AWAITING GINNING. GINS OF SOUTHERN BRAZIL HAVE BEEN UNABLE TO HANDLE THE 1933-34 CROP AS FAST AS IT ARRIVED. MUCH OF THE CROP IS SHIPPED LONG DISTANCES IN THE SEED.

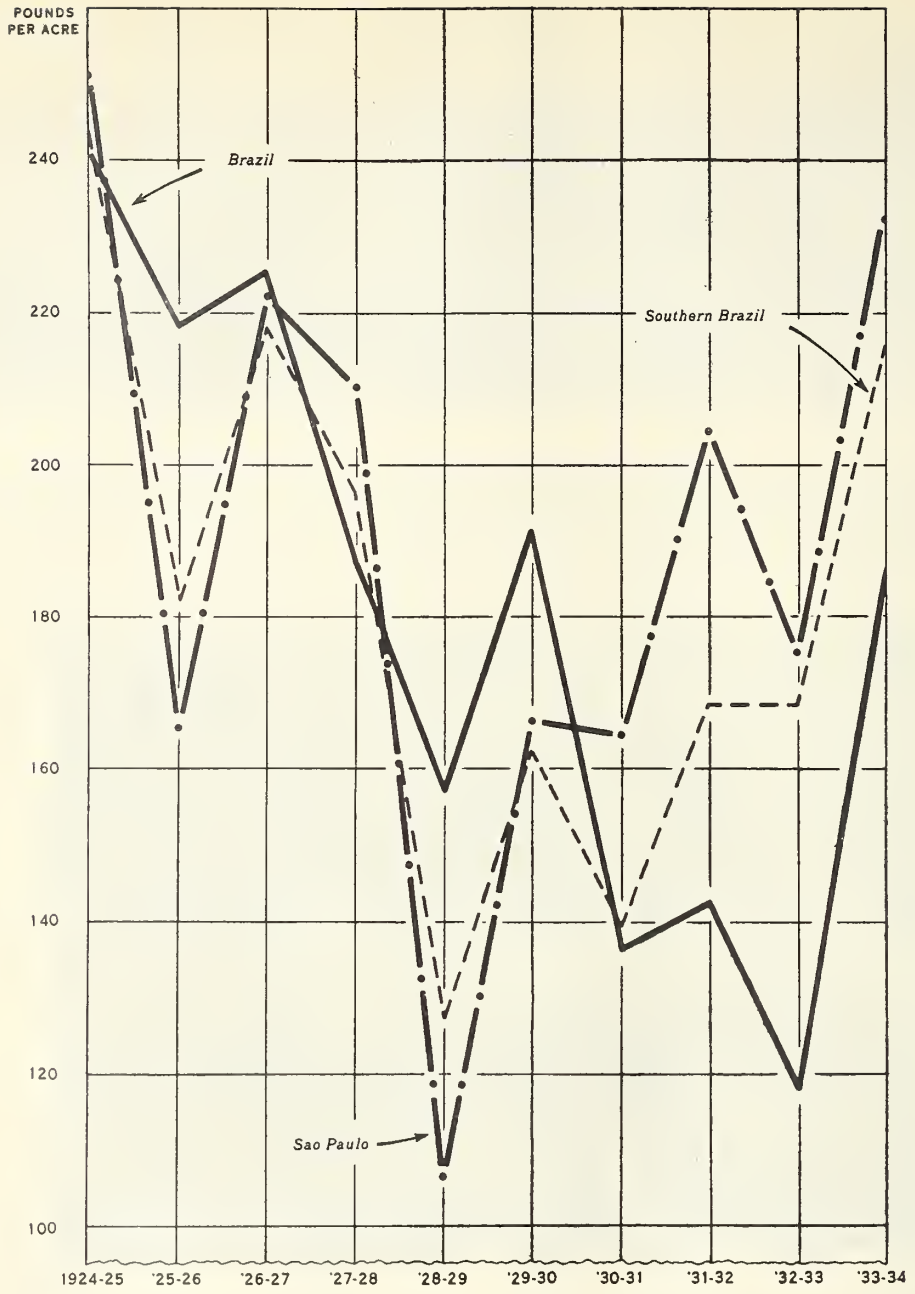

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FIGURE 8 - AVERAGE COTTON YIELDS IN BRAZIL, THE SOUTHERN STATES, AND SAO PAULO, 1924-25 TO 1933-34. THE TEN-YEAR AVERAGE YIELD FOR BRAZIL IS 180 POUNDS PER ACRE. WHILE FOR THE SOUTHERN STATES IT IS 182 POUNDS PER ACRE AND FOR SAO PAULO IT IS 189 POUNDS PER ACRE. YIELDS IN OTHER SOUTHERN STATES ARE LOWER THAN IN SAO PAULO.

QUALITY OF COTTON GROWN

All cotton of Southern Brazil is of the American Upland varieties, and the leading varieties were selected from Texas seed. While much of the Southern Brazilian crop may equal American cotton in staple length, it appears to be lacking in the factors generally included in the term "character," such as strength, uniformity, fineness, and freedom from fiber imperfections. Reports of shipments to Europe and other cotton manufacturing centers indicate a wide variation in quality; this lack of uniformity, however, is not so common of Southern Brazilian as of the Northeastern cottons.

Since very few gins have cleaning equipment, many of them turn out a low grade cotton containing a large amount of foreign matter. Many of the gins are also old and in poor repair.

The quality of cotton produced in Sao Paulo has been improved during recent years by a system of gin inspections provided by the Federal and State Governments and by the state control of seed distribution. The improvement in staple length in this state has been noticeable. By controlling the seed supply and allowing only approved varieties to be planted, the average staple length of the Sao Paulo crop has been increased from 15/16 inch to over an inch within the last few years. The improvement in both the grade and staple has been a factor in the increased use of Southern Brazilian cotton in the local mills.6/

The agricultural Experiment Station of Sao Paulo has recently developed two or three varieties of cotton well adapted to local conditions. These varieties are heavy yielders, fairly uniform in staple length, and otherwise superior to the common cotton grown. Much of the improvement in the staple length of the cotton of the state is due to the wide distribution of these new locally developed varieties. The work of the Sao Paulo Station located at Campinas is outstanding among the Brazilian Agricultural Experiment Stations.

The Federal Government is now attempting to extend the system of gin inspection, classification, and the distribution of seed to the whole cotton growing area.

CONSUMPTION AND EXPORTS

The cotton textile industry of Brazil has increased rapidly during the last ten years and is today the leading industry of the country. The number of spindles in operation in 1932 was estimated at 2,698,175, located in 369 mills, employing 118,809 people. The bulk, or 297, of these mills are located in Southern Brazil. This section of the country also has 2,142,184 spindles and 79,154 people engaged in cotton mill work.

Brazilian cotton mills now produce from 90 to 95 percent of the country's cotton textile requirement. Only the goods made from the highest-count yarns are imported. As the spinning industry of Southern Brazil developed, the use of local cotton increased. Mills of Sao Paulo, Rio de Janeiro, and Minas Geraes are using increasing amounts of locally grown cotton.

6/ The staple of Brazilian cotton is expressed in millimeters. The staple length as used above was converted on the basis of 25.4 millimeters = one inch.

Under the Brazilian Constitution each state has the right to impose a tariff on imports from other states. Some of the states now have a tariff on raw cotton and are thus requiring mills located within the state to use local cotton. This in turn has increased local production. An example of this is in the state of Minas Geraes, where consumption exceeds production. The tariff on raw cotton is credited with recent increases of cotton acreage in the state. In addition to the state tariff, there is a Federal tariff on all foreign cotton. At present this duty is so high that little or no foreign cotton enters the country. The local textile industry is also protected by a high tariff on finished goods and yarns. It is estimated that the present output of local mills of the Southern States offers a market for from 300,000 to 400,000 bales of cotton annually.

On the average in the past the Brazilian export has been about 10 to 15 percent of the annual cotton crop.7/ Most of this cotton has gone to Great Britain, Germany, Portugal, and France. While some Southern Brazilian cotton has been exported, the past average consumption of this area has, until 1933-34, exceeded the average production. The difference has come from the Northeastern States.

TABLE 7 - Cotton exports from Brazil and the Southern States of Brazil and Sao Paulo, 1924 to 1933

Year	Brazil	Southern States	Sao Paulo
	Bales of 478 lbs.	Bales of 478 lbs.	Bales of 478 lbs.
1924	29,815	4,222	2,743
1925	141,294	46,408	43,676
1926	76,963	2,243	1,586
1927	54,961	4,513	2,939
1928	46,167	34	5
1929	224,739	17,384	17,092
1930	140,282	299	261
1931	95,835	458	297
1932	2,377	---	---
1933	53,928	8,582	2,893

Compiled from official reports of the Brazilian Ministry of Agriculture, Rio de Janeiro, Brazil.

There is a strong feeling, especially in the state of Sao Paulo, that present conditions are favorable to the development of an export cotton market. Local newspapers publish editorials and stories of sales of cotton abroad as well as accounts of local planters and farmers who have made large sums from cotton. It is also pointed out that, while coffee is the leading export crop, it is well to develop a second major crop and that cotton is ideal for this purpose.

7/ Until recently (Feb.11, 1935) the official control of foreign exchange gave the exporter of cotton an advantage over the coffee exporter. During the first nine months of 1934 cotton exporters were required to sell only about 30% of their foreign exchange at the official rate while coffee exporters were required to sell practically all of their foreign exchange at the official rate, which was often 25% below the open market rate. This premium of cotton exchange over coffee exchange was the equal of an export bounty of 20% to 25% and assisted the exportation of the unusually large cotton crop of 1933-34. Recently this practice was discontinued and all exports are on an equal exchange basis.

Such a movement is gaining the support of the citizenry. Mass education is perhaps higher in Sao Paulo than in any other section of the country, and this, with the local political conditions, makes it possible to develop an interest in such a program. Local citizens who take pride in the development of the state are being encouraged to invest capital in cotton gins and other equipment, while large planters are encouraged to turn to cotton or finance small growers who wish to produce cotton. The full force of this movement is not easy to estimate, but it is, nevertheless, a factor in the development of the industry in Southern Brazil.

MARKETING AND FINANCING

The local cotton gin is the center of the present interior cotton market. Most growers dispose of their cotton in the seed. The cotton ginner is, therefore, the first or primary buyer. Many of these ginners, being small, are unable to invest the capital necessary to handle large quantities of cotton. Consequently, the ginner disposes of the cotton as quickly as possible. In the larger towns there have developed central markets where the buyers deal directly with the small ginners and in a few cases with the larger farmer. Some ginners also make a practice of handling the cotton of these central buyers who purchase directly from the farmers. These larger firms in the central market deal directly with export merchants or with buyers for local mills. The whole system of handling cotton is new, but as production in recent years has increased many merchants who have heretofore handled other farm commodities, as coffee, corn, beans, and rice, are entering the field as cotton buyers and the marketing machinery is developing rapidly.

One of the principal factors in limiting the expansion of cotton in Southern Brazil is the lack of capital available to the small farmer. While it is a common practice to borrow money for the production of coffee and the system of pledging coffee or coffee trees as collateral is well established, there is no well developed system of financing cotton production. Such credit as is extended is usually provided by the owners or operators of the gins or by the buyers of cotton who deal directly with farmers. There is at present a tendency, however, for large financial organizations to rediscount the loans of the ginners and small buyers, thus enabling them to extend credit to a larger number of growers as well as to prospective growers. There is perhaps no factor, aside from price, that will stimulate production as rapidly as an extension of credit to farmers who are now producing little or no cotton.

As the ginning industry is extended and the interest in the purchase and handling of cotton increases, there will develop a system of credit to both large and small producers based upon cotton as security. While this system may not at first be as extensive and as attractive to the large credit organizations as the highly developed coffee credit system, it will in time gain in popularity and will act as a stabilizing influence on future production.

COTTON vs. COFFEE

No statement on Brazilian cotton production is complete without a reference to coffee and its influence upon cotton. Coffee is the most important cash crop grown in Brazil. Brazil produces the bulk of the world's coffee crop, and fully 80 percent of the Brazilian crop is produced in the three states of Sao Paulo, Rio de Janeiro, and Minas Geraes, of which Sao Paulo is by far the most important. The history of coffee production is one of a rapidly expanding industry enjoying, until recent years, almost a monopoly of the world's market. Practically every industry is affected by the rise or fall of coffee prices, as the whole economic structure of the country has been built around the income from coffee. During the last hundred years the coffee growing belt has pushed farther and farther west. Enormous areas have been cleared and planted to coffee trees and millions of people have been employed in cultivating and gathering the crop. Coffee has served as a basis of agricultural credit and is by far the most important commodity.

The early settlers developed with slave labor large coffee plantations. After the slaves were liberated, immigrants, largely from Southern Europe, settled in the country, and as a result the plantations are now worked largely by white labor. Because of the cheap land, the old coffee plantations were abandoned as the soil became exhausted and new areas were planted. An example of this is found along the west slopes of the coastal mountain range in the states of Rio de Janeiro and Sao Paulo. A hundred years ago these mountain slopes were the chief coffee growing districts, but as the land became exhausted the plantations were abandoned and new lands taken up on the rolling plateau to the west. The increasing demand for coffee has brought about a steady movement of agriculture to the west. These old abandoned plantations have, in most cases, reverted to the native grasses and are now used for grazing and livestock farming.

A coffee plantation is often a complete community within itself. It may consist of thousands of acres, a part of which is in virgin forests. When many of the plantations were first settled seventy-five to a hundred years ago, they included enormous areas far in excess of any immediate need. It was a common practice for a plantation owner who had made a fortune in the mountain slope districts of the coastal range but whose land had become exhausted, to move farther west and stake out a plantation many times the size of his old holdings in the mountains. This accounts for the large areas in these plantations, many of which have since been subdivided several times but still contain great areas of virgin land. A present day coffee plantation may have from a few to several hundred families engaged in cultivating and caring for the trees. These people live in villages on the land and draw their supplies from the plantation commissary. They may also grow a small acreage of food crops, principally corn, beans, rice, and manioc, for home use. During the coffee growing season each family has a certain number of trees to cultivate and care for. The labor required to keep the coffee land clean is not as great as at the harvest season. An average family can care for more trees during the cultivating season than they can pick at harvest season. If a plantation owner utilizes all his available labor during the growing season cultivating

the trees, he will therefore be short of labor at harvest time. To relieve this situation many plantation owners depend upon the labor of small independent farmers who live near-by and who are willing to pick coffee during the harvesting season. Extra labor is sometimes obtained from the towns and cities. Many people living in towns are willing to work on the plantations during the coffee harvest season but prefer to spend the remainder of the year in town.

Once land is planted to coffee, the trees are seldom uprooted and other crops planted in their place. As a rule, coffee trees stand until the soil fertility is exhausted. The coffee tree is a perennial and comes into full production when about five or six years of age and may continue to produce for from 30 to 50 years. There are coffee trees in Sao Paulo 100 years old. While the expansion of coffee has been rapid, there are still large undeveloped areas in Southern Brazil capable of producing coffee, cotton, and other crops. The question of suitable land is not, therefore, a serious factor in the expansion of either coffee or cotton in Southern Brazil.

Many planters cultivate some kind of a crop between the rows of young coffee trees. This is particularly true during the first three or four years after planting, but is not so common after trees come into full production. Because cotton does not shade the young trees, it has in recent years come into prominence as a crop to grow between rows of young coffee trees. This practice has, therefore, become a factor in the expansion of the cotton acreage. Since 1930 there has been a restriction on the planting of coffee and many planters who would under normal conditions have planted new land to coffee trees have planted their new land to cotton. It is a common practice on many coffee plantations to clear and prepare a fixed amount of land each year for planting new coffee trees, but with the restrictions on planting during the last few years much of the newly prepared land has been planted to cotton. Should coffee prices rise and the restriction on coffee planting be removed, it is likely that planters will to some extent discontinue cotton on newly cleared areas and plant coffee as originally planned.

Southern Brazil, with a total of 22,700,000 people, 50 percent or more of whom live in towns and cities, has always been short of farm labor. The labor problem has been and is becoming more and more acute as the industries of the cities and towns develop. Plantation owners are constantly faced with the threat of strikes and other labor trouble during the harvest season. The peak of labor requirements of both coffee and cotton occur at about the same season of the year, that is, during the harvest from March to June. Most planters have sufficient labor to cultivate coffee or cotton, but as both of these crops require a great deal of hand labor during the harvest season, few planters have sufficient labor to harvest large crops of both. The family of the small farmer living near-by provides much of the extra labor required by the coffee planter at harvest season. As a rule, these small independent farmers depend upon the wages of their family as coffee pickers during the coffee harvest season for the family cash income. This in addition to the food they produce on their own land constitutes their total annual income. During years of high coffee prices, planters are able to pay rather attractive wages at harvest

season, but during periods of low coffee prices, such as have existed since 1930, the wages of coffee pickers have been low and a good many of these small independent farmers have discovered that they can make more money growing and picking cotton than as laborers on the coffee plantation. They therefore plant cotton following a period of low coffee wages. Coffee planters are, therefore, using more laborers from the cities and towns during the coffee harvest season.

A preliminary study 8/ of data available for the state of Sao Paulo indicates that the acreage planted to cotton is influenced by the ratio of cotton prices to coffee prices. Cotton acreage has tended to increase following seasons during which coffee prices were low as compared with cotton prices, and conversely, cotton acreage has tended to decrease following seasons during which coffee prices were high relative to cotton prices. For example, in 1924 the average March to June price of cotton was 220.9 percent of the average March to June price of coffee and the cotton acreage planted the following September to November was 337,700 acres. One year later the ratio between the prices of the two crops had changed so that the price of cotton was 117.5 percent of the coffee price and the acreage of cotton declined more than 100,000 acres. The ratio of prices in 1926 was slightly more than 100 percent and the cotton acreage declined to 130,000 acres. The 1933 ratio of cotton prices to coffee prices was 242.4 percent and the cotton acreage was the largest on record.

While the ratio of cotton prices to coffee prices is not wholly responsible for the cotton acreage fluctuations, there is no doubt that it was an important factor. The fact that the coffee acreage from 1924 to 1930 was expanding rapidly and that many coffee planters could grow cotton along with new coffee plantings influenced cotton acreage regardless of cotton prices during this period. Since 1930 the planting of coffee trees has been prohibited by law and many planters have turned to cotton and are now utilizing land for cotton production that would otherwise have been planted to coffee. Many of the large coffee planters, where they can obtain the labor, are turning to the production of cotton, not because they are giving up coffee but because cotton offers an opportunity for supplementing their reduced coffee income.

For a number of years prior to 1924 when coffee prices were relatively high, the acreage of coffee increased rapidly and, while cotton could have been grown between the rows of the young trees, planters apparently did not follow the practice to the same extend as during later periods of low coffee prices. In 1934, however, coffee prices began to decline. The fact that cotton may be grown on land occupied by young coffee trees at the discretion of the planter made it possible for planters to grow cotton in 1935 on an area in excess of the acreage that normally would have been expected. The 1933 cotton acreage is no doubt the result of an accumulation of considerable land cleared with the intention of planting to coffee, but because

8/ A statistical study of the relation of the Brazilian cotton acreage to the price of cotton and coffee is being made by the Division of Statistical and Historical Research for inclusion in the joint study referred to on page 1. This study also will include an analysis of the Brazilian and world coffee situation and outlook.

FIGURE 9 - COFFEE TREES IN SAO PAULO. BRAZIL LEADS THE WORLD IN THE PRODUCTION OF COFFEE. WHILE SOME COFFEE IS GROWN IN MOST OF THE BRAZILIAN STATES, SAO PAULO PRODUCES ABOUT 80 PERCENT OF THE BRAZILIAN CROP.

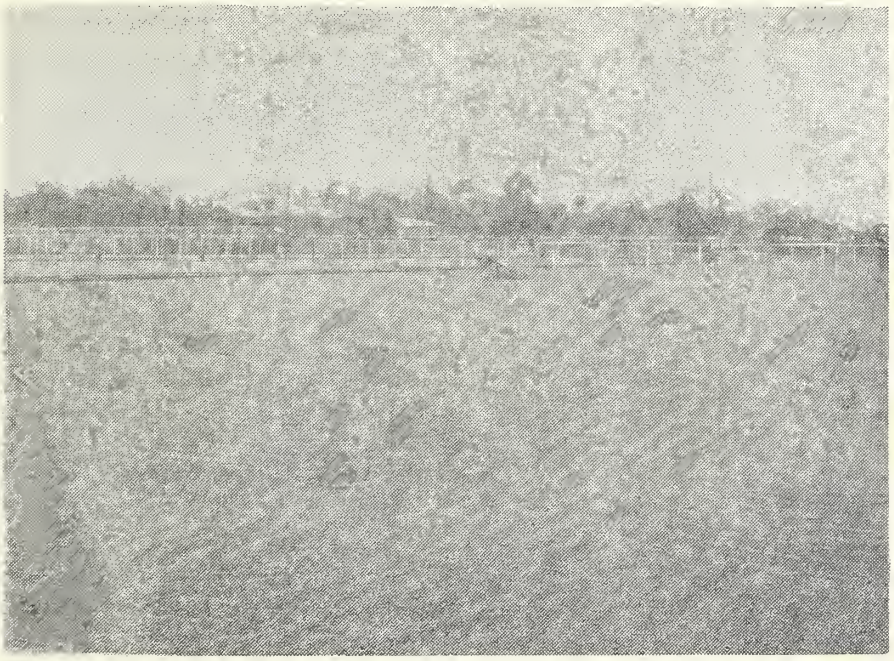

FIGURE 10 - DRYING COFFEE ON A MODERN COFFEE PLANTATION. THE PEAK OF LABOR REQUIREMENTS FOR COFFEE PRODUCTION OCCURS DURING THE HARVEST SEASON AND OFTEN INTERFERES WITH OTHER WORK, PARTICULARLY COTTON PICKING.

the planting of coffee trees was prohibited by law a large part of this area was planted to cotton, thus bringing about a cotton acreage in excess of that indicated by the price relationship. The 1933 cotton acreage is also the result of an accumulative interest in cotton. Brazilian coffee plantation owners have in the past preferred to grow coffee. Their entire plantation has been organized for the production of coffee, their labor trained in its cultivation and harvesting, and their credit based upon coffee as security. But when the price relation between coffee and cotton was such that the returns from cotton were much in excess of those from coffee, many planters, temporarily at least, have transferred a part of their effort to the production of cotton.

Small farmers living near large coffee plantations during periods of low coffee prices, which are reflected to the independent farmer in the form of low wages, also engage in the production of cotton. Thus the price of coffee, the wages of coffee laborers, and the price of cotton all influence the acreage of cotton in Southern Brazil.

TABLE 9 - Average price of cotton and coffee, the ratio of cotton prices to coffee prices, and the cotton acreage planted in Sao Paulo, 1924 to 1933

Year	Average price of cotton March to June	Average price of coffee March to June	Ratio of cotton prices to coffee prices	Cotton acreage planted Sept. to Nov.
	Cents per pound	Cents per pound	Percentage	Acres
1924	31.12	14.09	220.9	337,700
1925	22.17	18.87	117.5	235,900
1926	17.57	17.51	100.3	130,300
1927	17.18	13.43	127.9	104,800
1928	22.17	18.05	122.8	92,500
1929	18.93	18.26	103.7	52,200
1930	16.24	10.58	153.5	148,300
1931	8.65	5.74	150.7	228,100
1932	9.65	4.78	201.9	438,200
1933	11.73	4.84	242.4	859,900

Compiled from the reports of the Sao Paulo Merchandise Exchange, Sao Paulo, Brazil, and the official reports of the Ministry of Agriculture, Rio de Janeiro, Brazil.

OUTLOOK FOR COTTON PRODUCTION

Under the existing conditions it is likely that Southern Brazil will, in the immediate future at least, continue to increase its cotton production. The acreage to be harvested in 1935 may be double that harvested in 1934 and, with economic conditions about as at present, the 1936 acreage may be expected to remain at high levels.

The chief limiting factor in the future expansion of cotton production in this area is the shortage of farm laborers and the low efficiency of the average workers. The use of farm machinery, either horse drawn or motor driven, for the cultivation of cotton is being tried by several of the larger plantation owners as well as by a number of the small independent farmers. While the application of machinery to cotton production has not been entirely successful and many growers still continue to use only hand tools, there is the possibility of at least minimizing, to some extent, the labor shortage through the increased use of machinery. The present attitude toward immigration promises little in the way of increased workers. While large areas of land are available, much of it is still in forests and must be cleared before it can be brought under cultivation. The labor required to clear new land, while in some cases not great, is nevertheless a problem. In the event the present labor shortage is partially overcome by immigration or the wider use of farm machinery in cultivating cotton, there will still remain the difficulty of obtaining labor at the harvest season, especially if coffee wages are attractive.

In addition to the labor problem, there is in most of the cotton growing areas of Southern Brazil an acute shortage of ginning machinery. The gins have in the past been unable to handle the crop as harvested, and unless the ginning equipment is increased, this shortage will tend to retard expansion. Closely related to the ginning problem is the development of a credit system for the purpose of making loans to growers and for the marketing and handling of the crop. There appears to be ample capital in the country for this, however, and should the necessary gins be built and a system of production credit be established, this within itself would tend to act as a stabilizing influence on cotton acreage during periods of unfavorable conditions. Once the physical and financial facilities for handling the cotton crop are well established, it is less likely that the acreage will undergo wide annual fluctuations.

The most important short-time factor contributing to an increase of cotton acreage is price, or the relationship between the price of cotton and coffee. Farm labor is used for the production of the crop that appears to give the greater returns. Labor (because it is limited, it is in a position to choose) will, therefore, choose the crop that pays better. In view of the present coffee outlook, cotton may, for the next few years at least, offer the greater returns.

The influence of the local textile industry in Sao Paulo, Rio de Janeiro, and Minas Geraes will not only stimulate production but will also act as a stabilizing influence in this section. The desire of the Government to increase the value of the country's exports will tend to encourage the production of cotton in excess of the local requirements.

It would be reasonable to expect Southern Brazil to continue to produce sufficient cotton to satisfy the requirements of the local textile industry, about 300,000 to 400,000 bales annually. How much more will be produced for export will depend to a considerable extent upon the price relationship between cotton and coffee. Upon the whole, however, in view of the large potential cotton growing area, it seems likely that the trend of production of cotton in Southern Brazil will continue upward, with considerable fluctuations from year to year.

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